

I-405/SR 167 Corridor

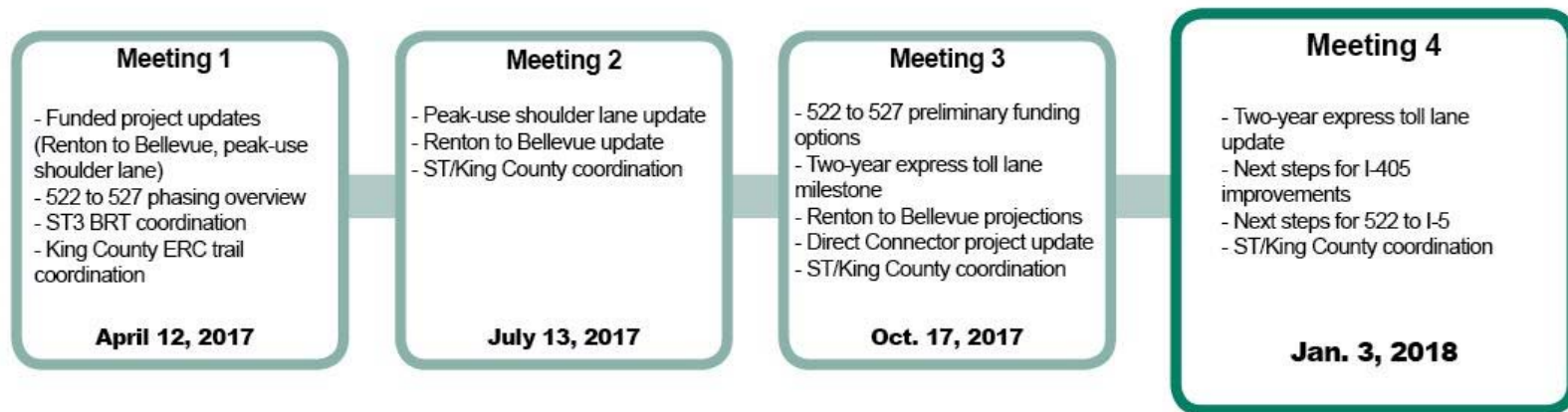
Executive Advisory Group

Meeting #4, Renton Community Center
Jan. 3, 2018

Introductions and Agenda

- Sound Transit update
- King County Parks update
- University of Minnesota study
- WSDOT update
 - Express toll lanes two-year performance update
 - Next steps for north end I-405 improvements
 - Funding and phasing for the north end
- Public comment
- Wrap-up

EAG Meeting Topics/Schedule



Key Discussion Questions for Meeting 4

- What are the EAG's recommendations on next steps for I-405 improvements?

I-405 Master Plan

Regional Consensus

- EIS Record of Decision, 2002
- *Multimodal, multiagency plan*

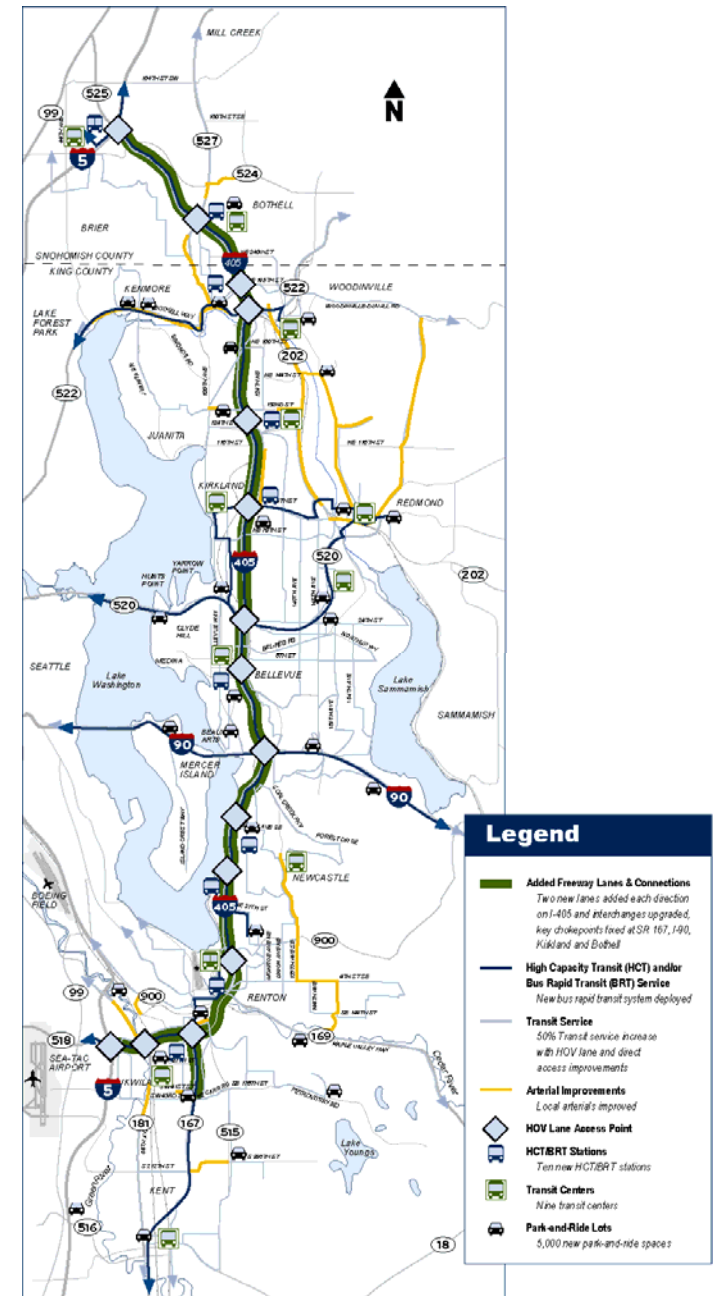
Roadways

- 2 new lanes in each direction
- Local arterial improvements

Transit & Transportation Choices

- Bus Rapid Transit system
- New transit centers
- 50% transit service increase
- HOV direct access ramps and flyer stops
- Potential managed lanes system
- 5000 new Park & Ride spaces
- 1700 new vanpools

Environmental Enhancements



Sound Transit Update

I-405 Bus Rapid Transit

Don Billen

Acting Executive Director

Planning Environmental and Project Development

Sound Transit

King County Parks Update

Eastside Rail Corridor Regional Trail

Erica Jacobs
Project Manager
King County Parks

Eastside Rail Corridor Regional Trail WSDOT Executive Advisory Group January 3, 2018





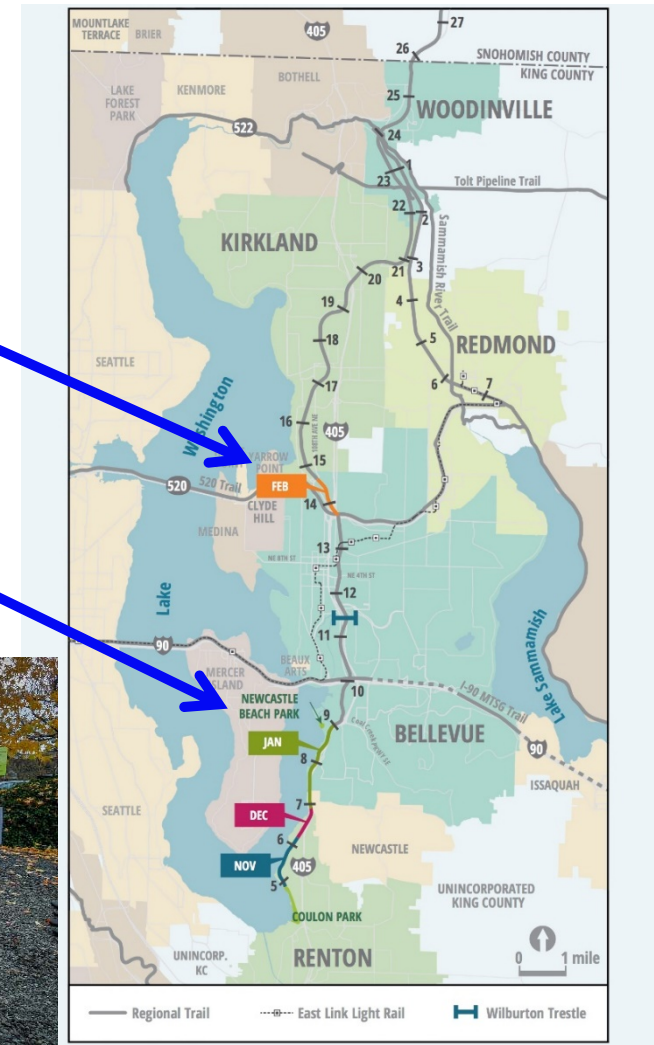
Presentation Overview

- Rail Removal and Interim Trail Update
- Segments in Design
- WSDOT Trail Projects in ERC
- Prioritized Implementation Timeline
- TIGER Grant Submission

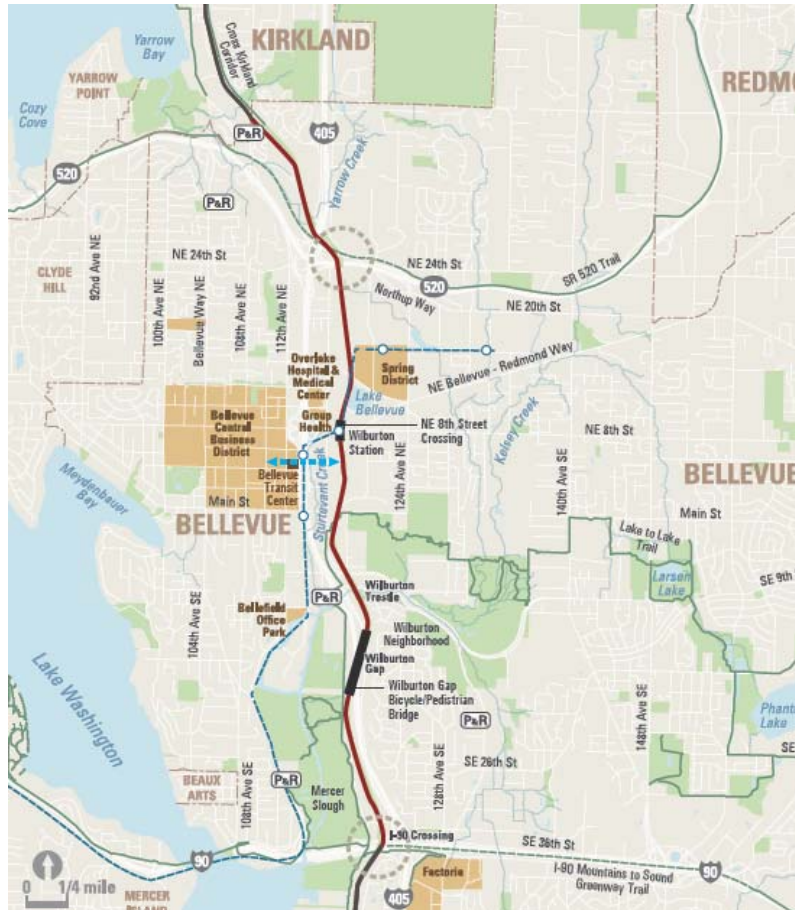
Interim Trail Under Construction



- From Cross Kirkland Corridor at 108th Ave. NE to SR 520
 - One mile section connecting Kirkland into Bellevue
- From Gene Coulon Park to Newcastle Beach Park
 - Four mile section with connections between Bellevue and Renton



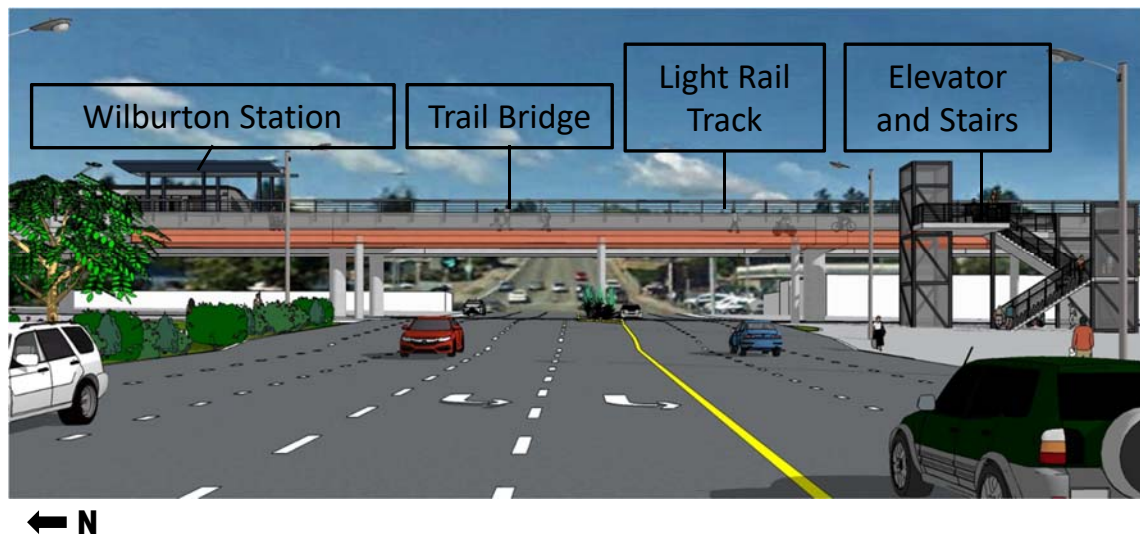
Wilburton Segment Design: 2017-2019



- Funded with Parks Levy and \$2 million Federal Highway Administration (FHWA) Grant
- Most urban and dynamic portion of the trail including:
 - *Historic Wilburton Trestle*
 - *Connections to SR 520 and I-90 Trails*
 - *Major crossings and bridges over I-90, I-405, NE 8th Street and others*
 - *At the heart of the redeveloping Wilburton area*
 - *Connections to East Link Light Rail Stations, Spring District*
- Public and stakeholder engagement will begin early 2018



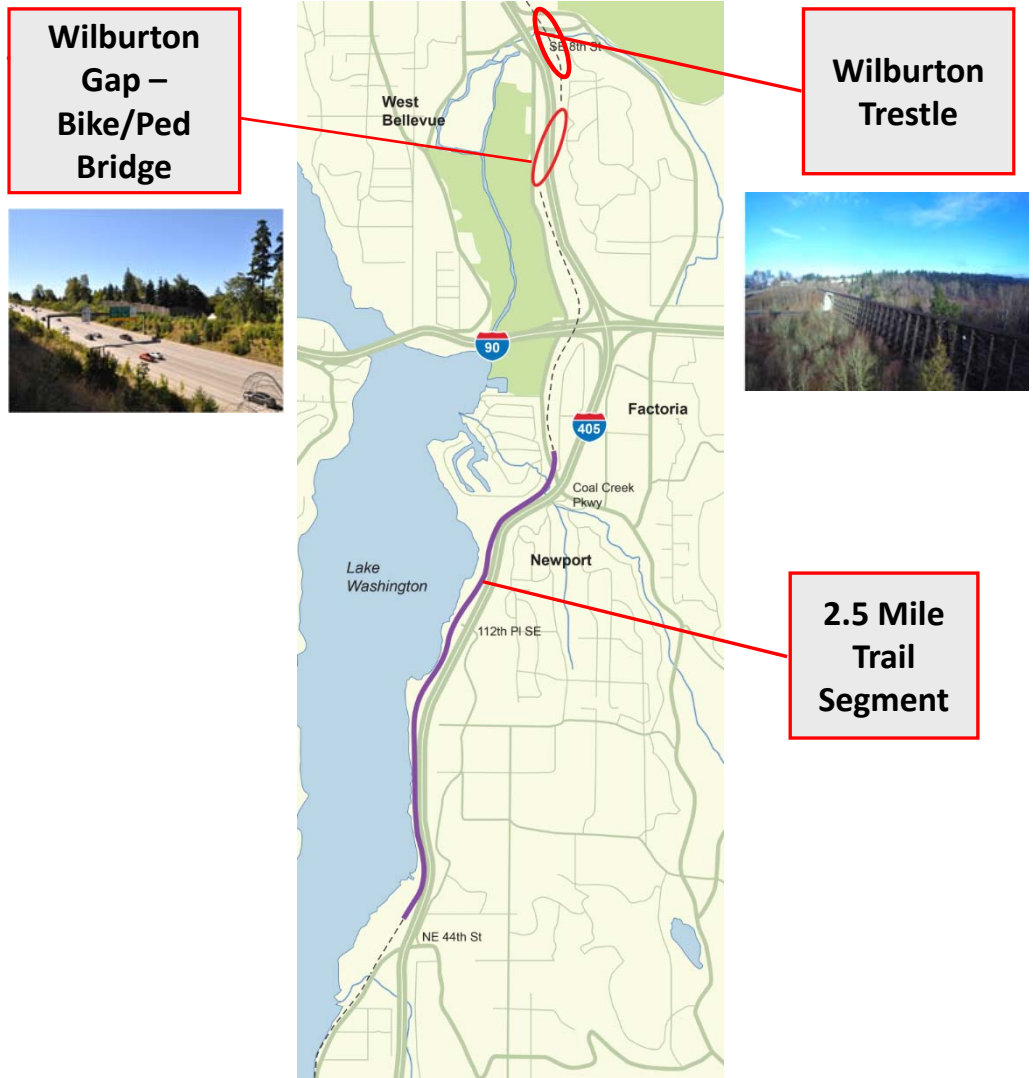
NE 8th Street Crossing Design: 2017-2019



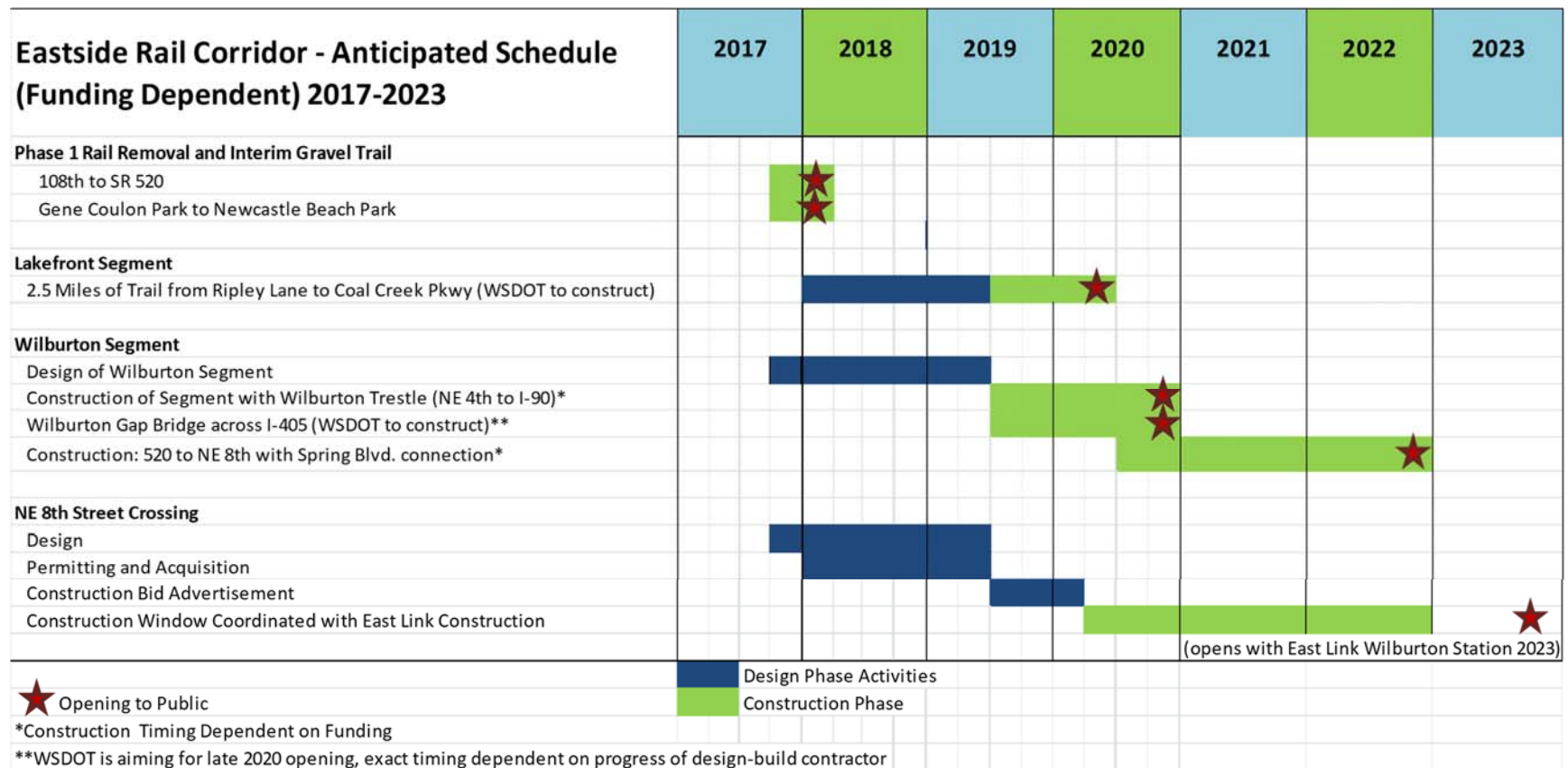
- Grade-separated trail crossing of NE 8th Street in Bellevue
- Partially funded with FHWA grant
- Overall Goal: Achieve best possible integration of trail with Wilburton Station and surrounding land uses
- Possible construction timing 2020-2022 (pending funding)
- Art integration into bridge design: artist selected by 4Culture
- Public and stakeholder engagement to begin early 2018

WSDOT Trail Projects

- I-405 Bicycle-Pedestrian Bridge at the Wilburton Gap, timed with Wilburton Trestle construction and opening
- 2.5 miles of trail in the ERC between Ripley Lane and Coal Creek Parkway
- Interagency Design Criteria Workshop December 12th
- Design-Build Contract Advertisement 2018
- Construction July 2019 – December 2020



ERC Timeline of Prioritized Segments



Federal TIGER Grant Submission

- Kirkland and King County partnered to submit a TIGER* grant for the Wilburton Center Segment and Totem Lake Connector.
- \$25 million- TIGER funding request
- \$44 million – total project cost
- Over 50 letters of support, including
 - 5 Federal elected officials
 - 12 State elected officials
- www.kingcounty.gov/EastsideConnect

*Transportation Investment Generating Economic Recovery (TIGER) Grant Program



Questions?

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www.kingcounty.gov/eastsiderailcorridortrail



PARKS

Your Big Backyard

Washington State Legislature Joint Transportation Committee Study on I-405 Express Toll Lanes

Dr. Alireza Khani

Department of Civil, Environmental
and Geo-Engineering
University of Minnesota

I-405 Traffic Data and Corridor Performance Study

Draft Findings and Recommendations

Presentation to the Washington State
Department of Transportation

Renton, WA

January 3, 2018

Study Objectives

- “Independent and objective analysis”
- Describe performance on various segments of the I-405 corridor representing typical trips, and describe where the corridor is working, and where it is not working
- What evidence (i.e. performance measures) can be obtained from the data about the effectiveness of the ETL corridor during its pilot phase?

Statutory Performance Measures

Washington state statute RCW 47.56.880 lists several general performance measures for the I-405 ETL facility. Of these, three measures are of primary interest to this study:

- Whether the express toll lanes generate sufficient revenue to pay for all I-405 express toll lane-related operating costs;
- Whether the express toll lanes maintain speeds of 45 miles per hour (mph) at least 90 percent of the time during peak periods; and
- Whether the average traffic speed changed in the general purpose lanes.

Key Findings

Financial Performance Measure Met.

ETL Speed Performance Measure Not Met.

This study finds that on average the amount of time in peak period where ETL speed is above the 45 mph statutory goal is 85 percent in the northbound direction and 78 percent in the southbound direction (Jan 2017 – Jun 2017).

GPL Speeds Showed No Significant Change.

Study Process

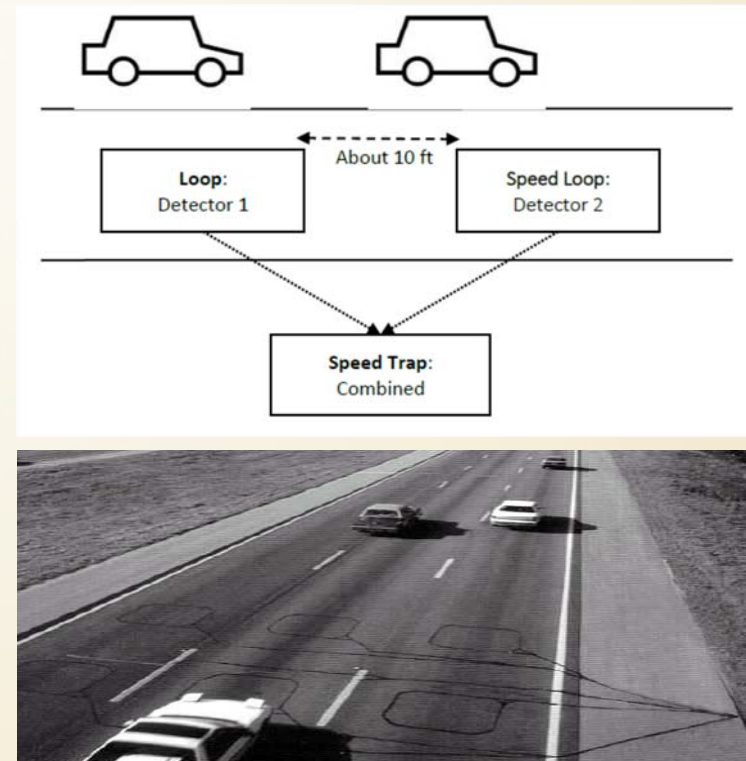
- Six month study (began June, 2017)
- Extensive work with staff workgroup (staff from JTC, Legislature, OFM, WSDOT, Transportation Commission)
- Data transfer from WSDOT completed in August, 2017
- Developed **database and computer programs** specifically for this study

Approach to Data Analysis

- Three potential sources of data:
 - WSDOT loop detectors
 - ETL toll transaction data
 - HERE/INRIX cell-phone derived data
- Data source characteristics:
 - Availability
 - Content: traffic volume, speed, density, travel time
 - Resolution

Double Loop Detector Data

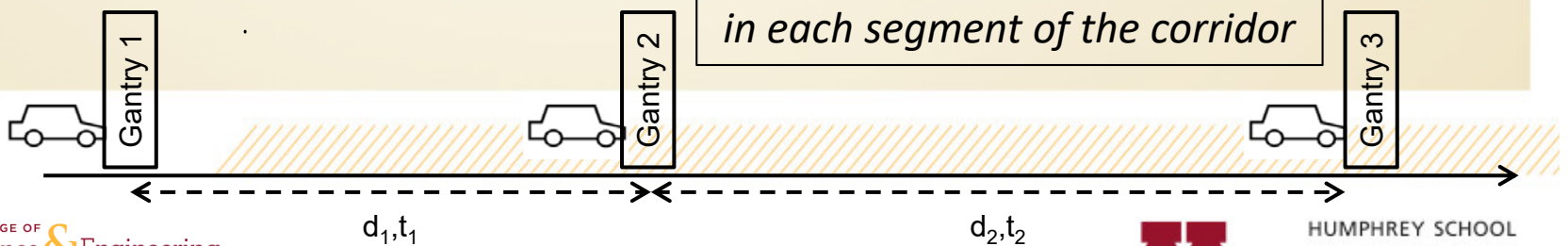
- Source: WSDOT
- Speed and volume per lane
- Every 0.5 miles
- Every 20 seconds
- January 2014 to June 2017
- Nearly 13M records per month



ETL Transaction Data

- Source: WSDOT
- ETL *volume and travel time*
- By origin/destination, January, 2016 – June, 2017
- Per segment, every minute
- Vehicle location & time at ETL gantries (10 NB and 11 SB)
- Trip types: HOV, AVI, IMG
- More than 4M records per month

ETL Transaction data tells us which trips are more common and the volume they comprise in each segment of the corridor



HERE & INRIX Data

- Derived from use of proprietary smart phone navigation apps
- Tracks aggregate travel time
- Every 5 minutes
- For cars and trucks
- Nearly 300K records per month
- **Not used for analysis in this study**
 - No lane information
 - No distinction between GPL and ETL
 - No volume information



Available WSDOT Data

What can be obtained from **Loop Detector** & **ETL Transaction** data?

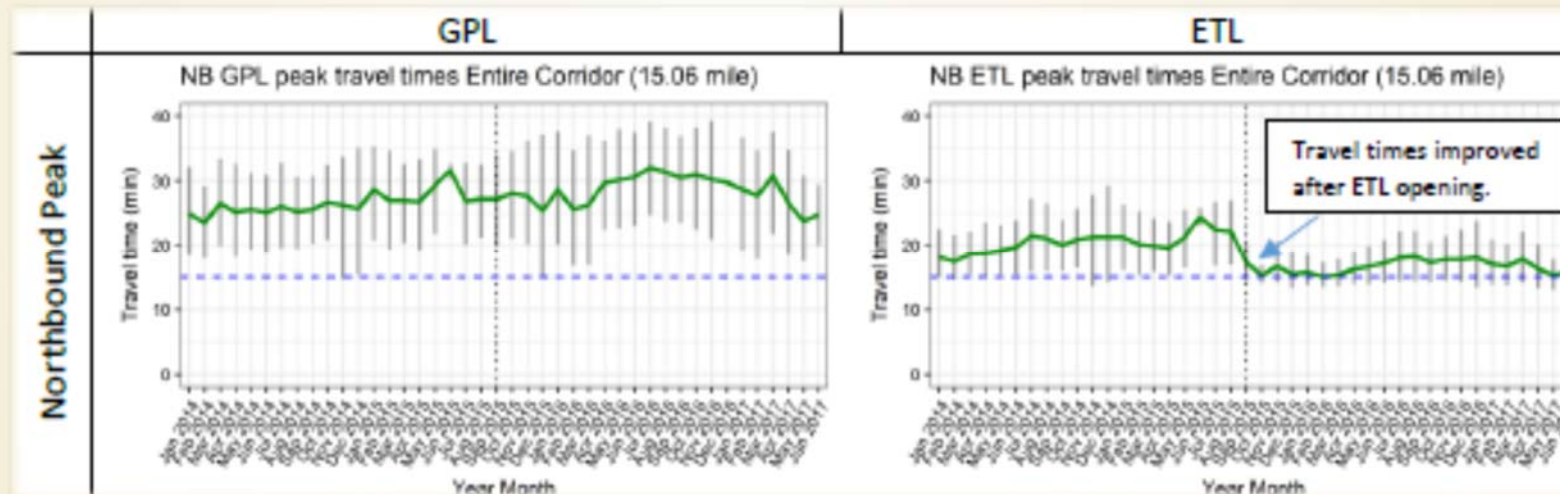
- Volume:
 - Both on GPL and ETL
 - Both before and after
 - Speed:
 - Both on GPL and ETL
 - Both before and after
 - Travel Time:
 - Both on GPL and ETL
 - Both before and after
- Widely accepted/being used
 - High volume/amount
 - High resolution
 - Comprehensive (complete info)

Data Summary & Comparison

| Data set | Loop Detector Data | ETL Transaction Data | HERE Data |
|-----------------|---|---|---|
| Available dates | Jan 2014-Jun 2017 | Oct 2015-Jun 2017 | Partial months from 2013 to 2017 |
| Contents | Speed and volume, date, time, milepost and lane information | Transaction date, time, locations, toll amount, etc. | Estimated segment travel times |
| Sample rate | 20 seconds, every 0.5 miles | Real time at 21 gantries | 5 minutes, 0.5-0.8 miles |
| Advantages | Provides both volume and speed info; High resolution data; Provides lane usage info; Provides good coverage along the corridor | Tracks trips on ETL, so complete trip info; Provides accurate travel time info; Provides accurate volume info | Estimated travel times for different types of vehicles |
| Disadvantages | Reported speeds are local, need processing for travel time | Lacks info on GPL and HOV lanes before ETL | No volume information; No distinction between ETL and GPL; No lane usage info; Small sample size; Potentially biased travel times |
| # of records* | 13 million / month | 4 million / month | 300,000 / month |

* # of records does not necessarily mean the number of sampled vehicles.

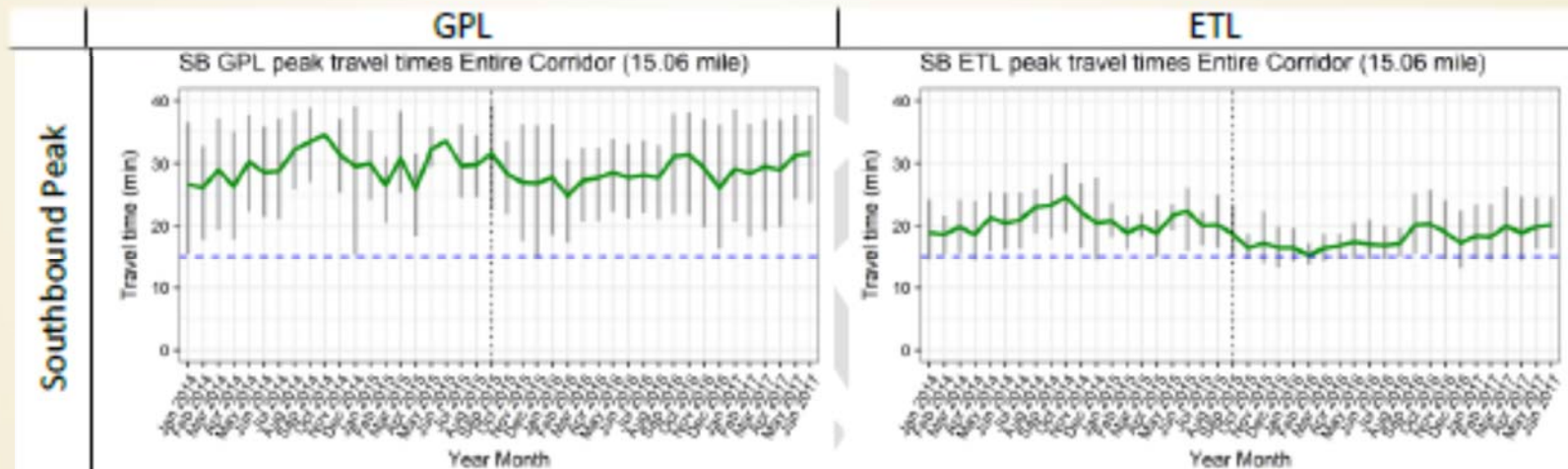
NB Monthly Travel Times, Jan 2014 – Jun 2017



Effect of opening the ETL in September, 2015

- Improvement in NB ETL peak-period travel times
- Little change in NB ETL off-peak or GPL peak-period travel time
- NB GPL travel times do not show noticeable changes after opening of ETL
- Travel time variation in the segments between NE 85th St to NE 160th St and between SR 520 to ST 522 (high travel time variability indicates lower reliability)

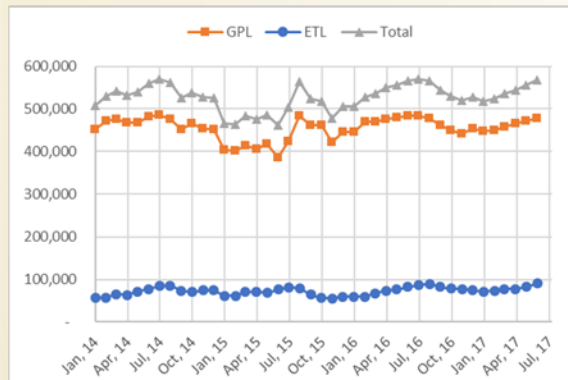
SB Monthly Travel Times, Jan 2014 – Jun 2017



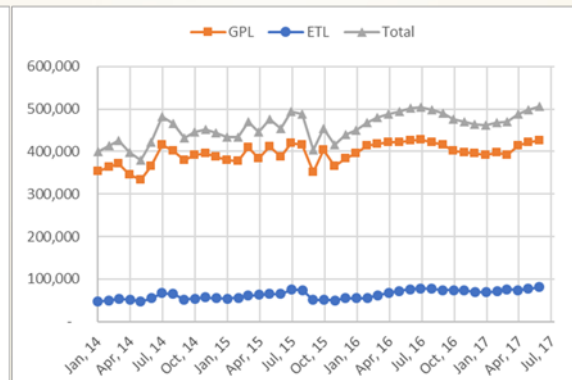
Effect of opening the ETL in September, 2015

- Travel times on all segments of the ETL are lower and more reliable compared with travel time on the HOV lanes before opening the ETL
- Noticeable but less dramatic improvement in SB ETL off-peak travel time
- Improvement in ETL peak-period travel times in all depicted common-trip segments
- No sustained change in GPL travel times

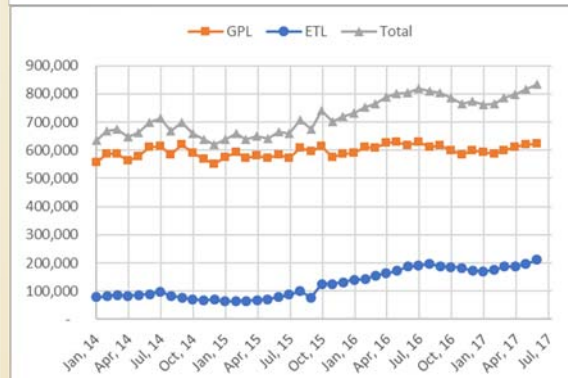
Average daily VMT increased throughout the corridor



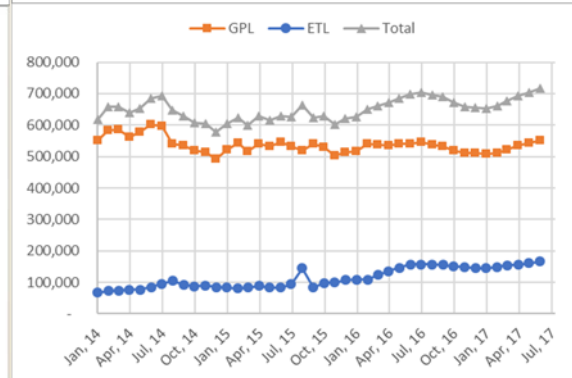
In the SB single ETL section, VMT increased on both GPL and ETL



In the SB double ETL, VMT increased on both GPL and ETL



In the NB single ETL section, VMT increased on both GPL and ETL



In the NB double ETL section, VMT increased on both GPL and ETL

Average daily VMT increased throughout the corridor

| Northbound | GPL | HOV/ETL | Total |
|----------------|---------|---------|-----------|
| Jan-Jun 2015 | 924,600 | 144,342 | 1,068,942 |
| Jan-Jun 2017 | 936,339 | 229,857 | 1,166,195 |
| Percent Change | 1.3% | 59.2% | 9.1% |

- The corridor carries more vehicles after ETL opening
- Along with better travel times, this indicates a better-performing corridor

| Southbound | GPL | HOV/ETL | Total |
|------------------|-----------|---------|-----------|
| Jan-Jun 2015 | 983,689 | 137,213 | 1,120,903 |
| Jan-Jun 2017 | 1,067,442 | 266,858 | 1,334,299 |
| Percent Increase | 8.5% | 94.5% | 19.0% |

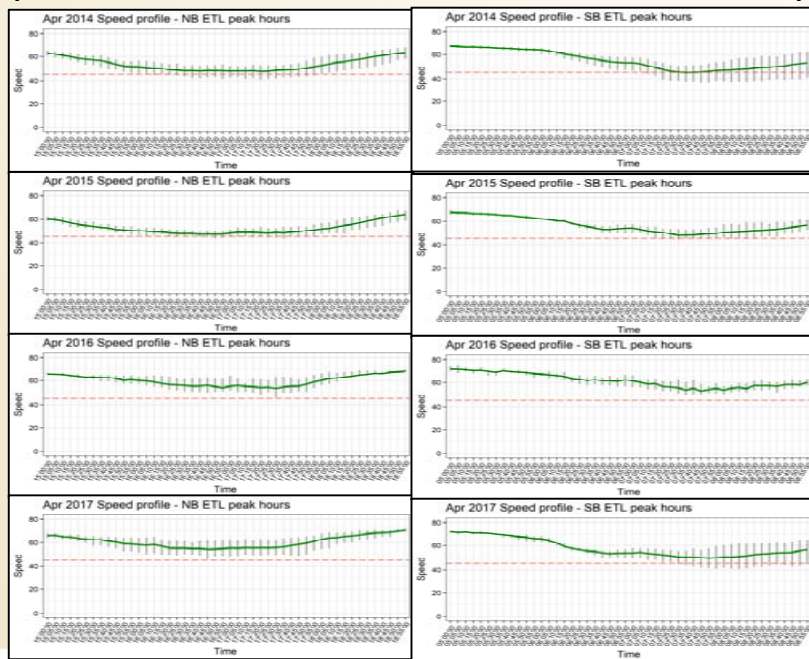
- For comparison, the average Washington State VMT increased in 2014 by 1.7%; in 2015 by 3.6%; and in 2016 by 2.7%

ETL volume in peak period increased more than its capacity increase

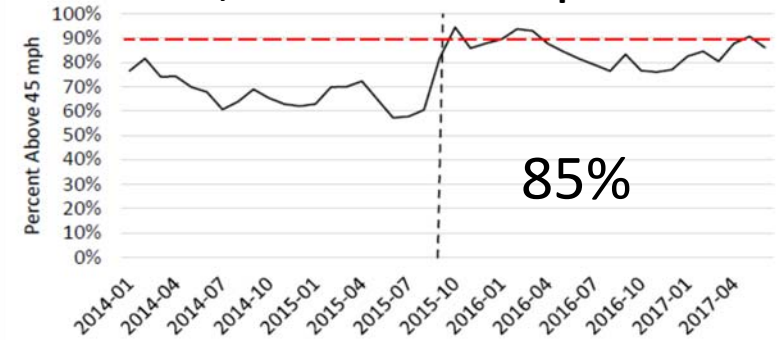
| Direction | Section | Lane Type | Jan'15-Jun'15 Avg | Jan'17-Jun'17 Avg | Percent Change |
|-----------|----------|-----------|-------------------|-------------------|----------------|
| NB | Single | GPL | 102,903 | 105,754 | 2.8% |
| | | HOV/ETL | 25,441 | 36,451 | 43.3% |
| | | Total | 128,344 | 142,205 | 10.8% |
| | Double | GPL | 133,248 | 128,228 | -3.8% |
| | | HOV/ETL | 32,039 | 79,584 | 148.4% |
| | | Total | 165,287 | 207,812 | 25.7% |
| | Total NB | | 293,632 | 350,017 | 19.2% |
| SB | Single | GPL | 86,252 | 104,724 | 21.4% |
| | | HOV/ETL | 20,972 | 29,588 | 41.1% |
| | | Total | 107,224 | 134,312 | 25.3% |
| | Double | GPL | 147,249 | 150,812 | 2.4% |
| | | HOV/ETL | 21,855 | 74,987 | 243.1% |
| | | Total | 169,104 | 225,799 | 33.5% |
| | Total SB | | 276,328 | 360,111 | 30.3% |

ETL & GPL Speed Profiles

We analyzed monthly lane type speed throughout the corridor, by time of day. This led us to our conclusions about the percent of time the ETL was above 45 mph.

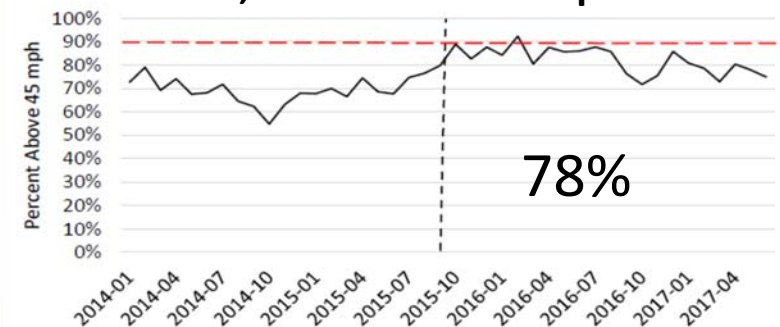


Northbound, % ETL above 45 mph



85%

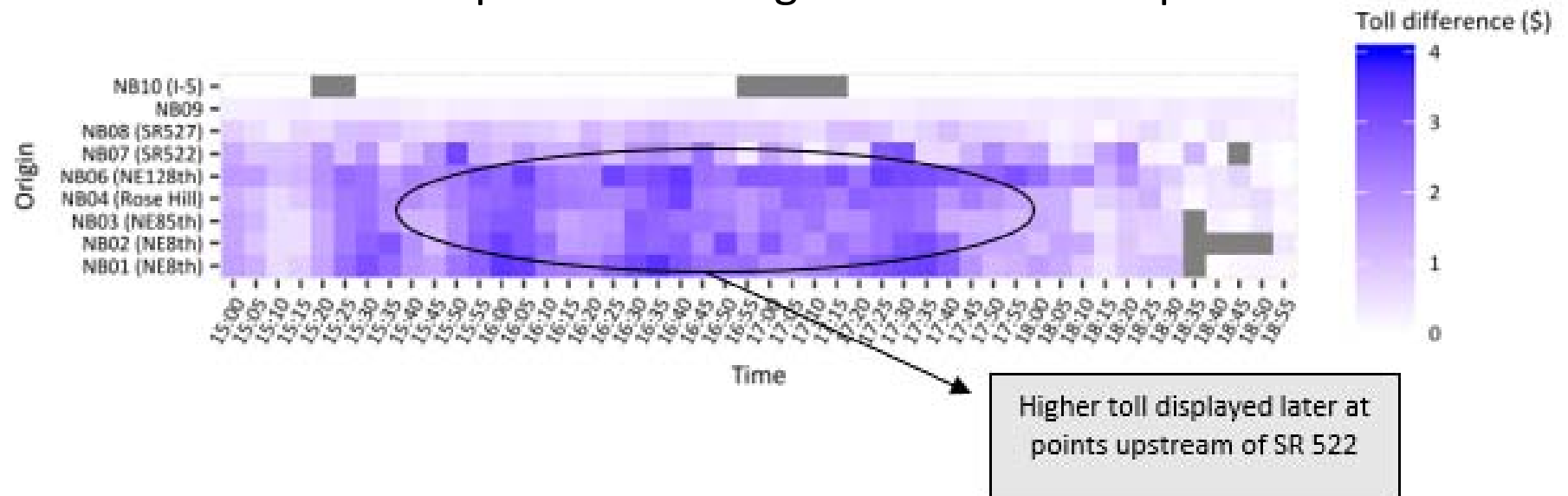
Southbound, % ETL above 45 mph



78%

NB Peak Average Toll Difference (Apr 2017)

This is a **key finding** in our study: the maximum toll in the ETL during peak hours is too low to keep traffic flowing at or above 45 mph 90% of the time

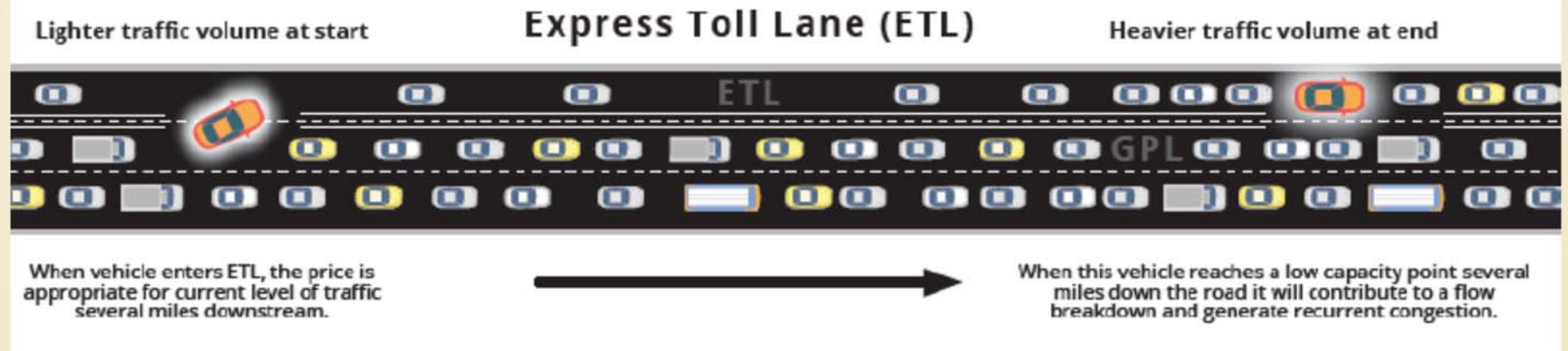


In peak hours, drivers entering the ETL “lock in” a toll rate that doesn’t always reflect building traffic volume. Drivers paid as much as \$4 less than what was required to keep traffic flowing, based on the traffic in the corridor at the end of their trip.

ETL Facility Breakdown

THE PROBLEM: ETL speeds falling short of 45 mph threshold + facility breaking down too often.

THE CAUSE: Toll rates not responding fast enough to volume changes + motorists allowed to lock in toll rates not reflective of actual conditions.



Corridor Performance Findings

1. ETL speed performance measure not met
2. Speed improved after transforming HOV lane to ETL
3. ETL facility increasing corridor throughput
4. GPL Speeds showed no significant change
5. ETL toll rates max out during 15 percent of peak period
6. Tolling algorithm is not optimally responsive and toll rate is too low as traffic volume builds

Variables Likely Impact Corridor Performance

Many factors are impacting the GPL speeds:

- Opening of the 1.8-mile northbound shoulder lane
- Recent changes in striping, signage and merge lanes
- Population growth in the area
- Change in carpool rules from 2+ HOV to 3+ HOV

Relative impact of multiple variables on corridor performance cannot be measured without the use of more sophisticated traffic modeling.

Recommendations

Top Tier Short-Term Recommendations

1. Improve ETL speed through a more responsive dynamic toll algorithm
2. Improve ETL speed through segmented corridor tolling

Recommendations

Second Tier Short-Term Recommendations

3. Move toward an “open access” ETL facility to smooth lane transfer
4. Increase maximum toll rate to reduce ETL breakdown
5. Adjust AM peak period times to increase ETL speed

Recommendations

Long-Term Recommendations

6. Extend second full ETL in each direction to improve ETL speed and capacity
7. Add capacity to ensure lane continuity and ease bottlenecks
8. Increase transit options to improve throughput and speed

Recommended Future Studies

- Analyze corridor travel demand patterns by origin-destination and alternative routes and propose a pricing algorithm with prices varying by entrance ramp location
- Conduct field tests of different price ranges and price change increments to determine Value of Time (VOT) and price elasticities
- Develop a traffic simulation model to experiment with different pricing algorithms and to optimize pricing algorithm parameters.

Conclusion

The I-405 ETL facility is meeting statutory performance measure related to financial sustainability, but not the performance measure related to average ETL speeds.

- Due in part to overall traffic volume growth and a toll rate algorithm and pricing not adequately responsive to rapidly-increasing traffic volume during peak periods

As time passes and conditions change, even the most sophisticated ETL facilities require regular adjustments.

- Recommendations should be considered part of the natural evolution of the corridor, not criticisms of work that has been done in the past.
- Implementation of recommendations should improve I-405 ETL performance and increase throughput and efficiency

Questions?

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Discussion

Facilitated by:
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Secretary of Transportation

WSDOT Update

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Director
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Kim Henry, P.E.

Program Administrator
I-405/SR 167 Corridor Program

Doug Vaughn

Chief Financial Officer
WSDOT

University of Minnesota Study

UM study validates WSDOT data

- UM findings are consistent with WSDOT analysis of I-405 corridor.
- UM study reinforces that with express toll lanes:
 - Speeds and reliability has improved over previous HOV lanes
 - More vehicles are moving through the I-405 corridor.
- Study examined data through June 2017.

University of Minnesota Study

| Recommendations | Next Steps |
|--|---|
| Improve ETL speed through a more responsive dynamic toll algorithm | <ul style="list-style-type: none">• WSDOT is working on changing the algorithm to update the toll rate more frequently.• In addition, WSDOT is evaluating other changes to make it more responsive to increasing traffic volumes during the peak period commute. |
| Improve ETL speed through segmented corridor tolling | <ul style="list-style-type: none">• WSDOT has planned segmented tolling for the 40-mile corridor.• Further analysis required to determine feasibility of near-term implementation. |
| Move toward an “open access” ETL facility to smooth lane transfer | <ul style="list-style-type: none">• WSDOT has extended ETL access and changed access types in several places based on driver feedback.• Further analysis needed to understand potential tradeoffs. |
| Increase maximum toll rate to reduce ETL breakdown | <ul style="list-style-type: none">• Washington State Transportation Commission sets maximum toll rate. |

University of Minnesota Study

| Recommendations | Next Steps |
|---|---|
| Adjust AM peak period times to increase ETL speed | <ul style="list-style-type: none">• WSDOT will study the effects of this potential change. |
| Extend second full ETL in each direction to improve ETL speed | <ul style="list-style-type: none">• Legislature provided \$5 million to begin engineering additional capacity in northern, single-lane section.• WSDOT has begun engineering and phasing strategies to provide capacity improvements in that area. |
| Add capacity to ensure lane continuity and ease bottlenecks | <ul style="list-style-type: none">• The I-405 Master Plan is the long-term plan to manage congestion in the corridor.• WSDOT continuously monitors current and future traffic to prioritize capacity improvements from the Master Plan. Identified improvements require funding and authorization from the State Legislature. |
| Increase transit options to improve throughput and speed | <ul style="list-style-type: none">• Sound Transit 3 includes a \$860 million investment to implement Bus Rapid Transit by 2024, which coincides with the completion of Renton to Bellevue Express Toll Lanes - completing the 40-mile system.• The I-405 Master Plan identifies BRT and other transit improvements including HOV direct access ramps for the corridor. |

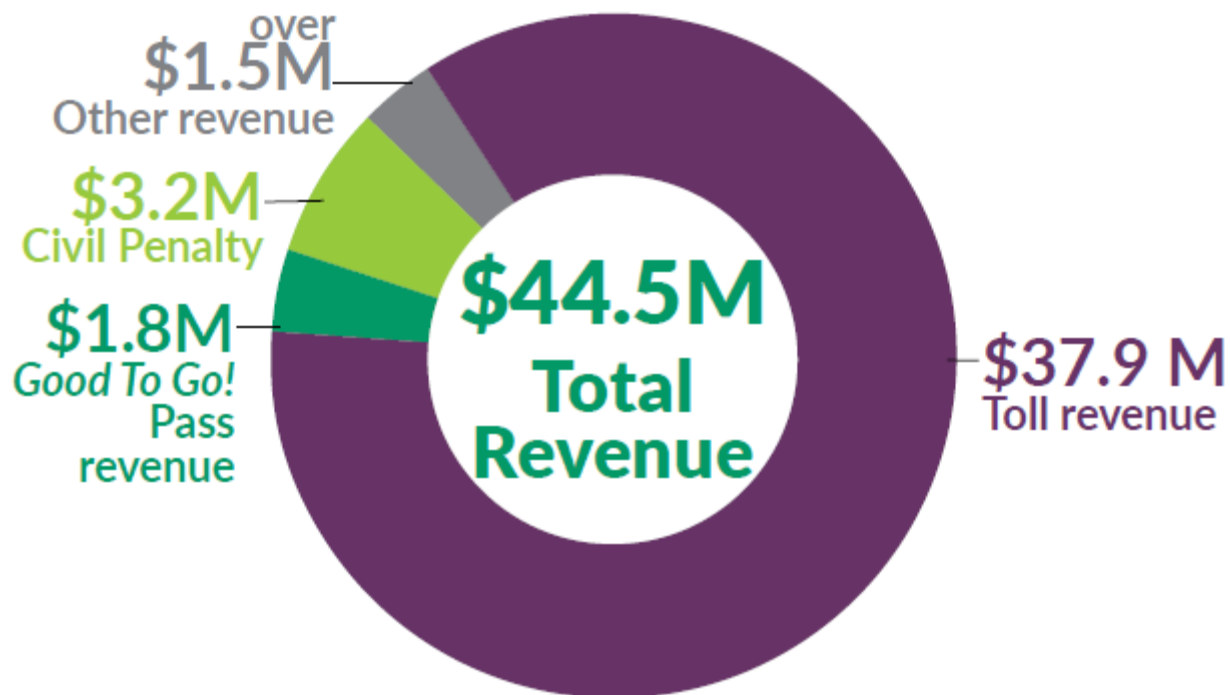
Next steps on recommendations

- WSDOT will conduct further analysis to determine which recommendations can be implemented.
- Discussion with the Legislature and Washington State Transportation Commission will be necessary on how to address some of the recommendations in the report.

Updated data shows further improvements

- Updated WSDOT data shows further improvements in speed and performance after UM study timeframe.
- Latest data from April – September 2017 shows ETL reliability increase; ETL moving 45 mph 85% of the time (94% northbound / 76% southbound)
- Spring and Summer 2017 data shows GP lane speeds now moving faster than two year ago in most places.
- Express toll lane speeds have held steady in most places, increased significantly northbound from Bothell to Lynnwood.

Revenue



TOTAL REVENUE

\$44.5M

OPERATIONS
COSTS

\$15.7M

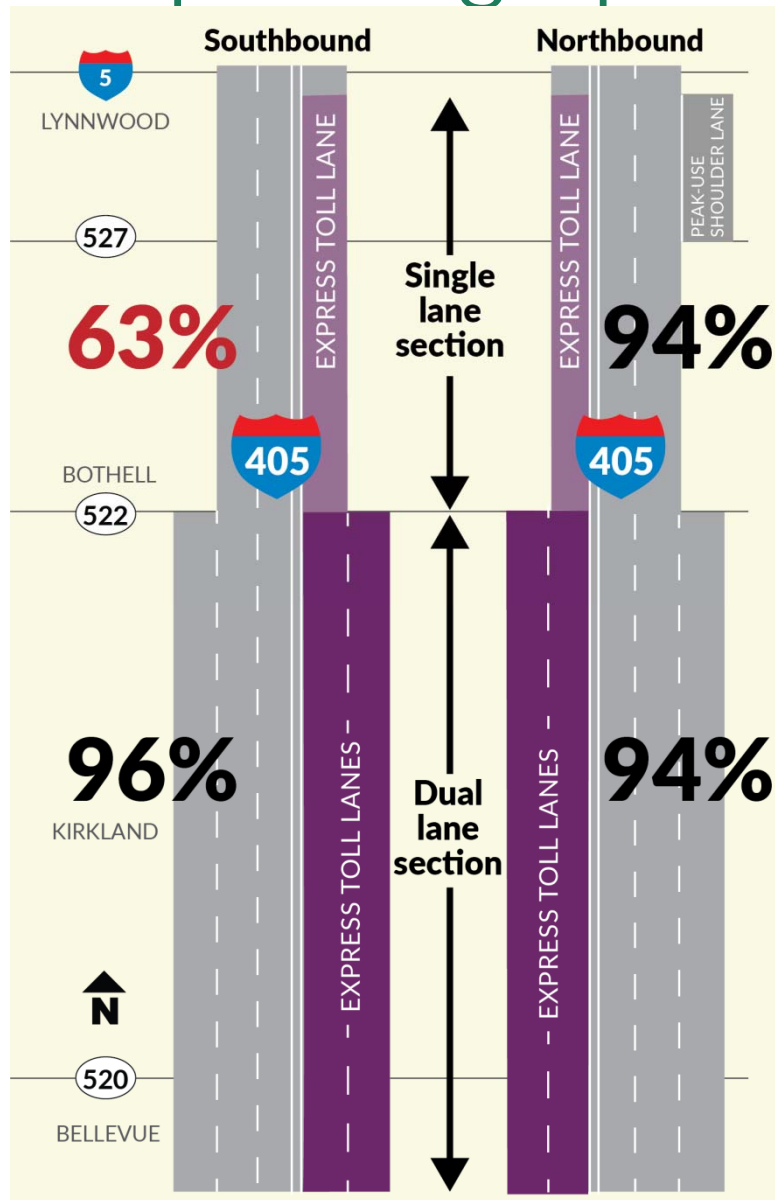
TOLL REVENUE
USED
FOR
PEAK-USE
SHOULDER

\$11.5M

REMAINING
FUNDS
FOR I-405
IMPROVEMENTS

\$17.3M

Improving speed performance



Speeds have improved over HOV lane

- Between April and September, express toll lanes speeds moved 45 mph or faster **85%** of the peak period. This is an improvement over the previous HOV lane which met this standard only **56%** of the time.

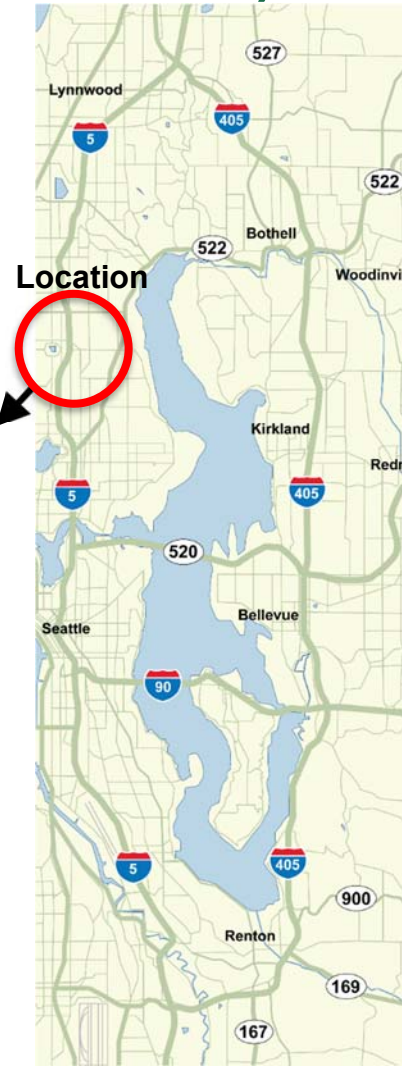
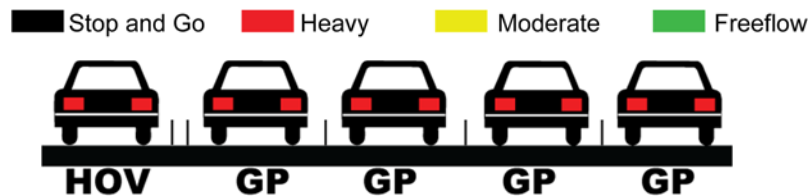
Three of four segments exceed goal

- When looking at individual segments, the southbound single-lane section is the only section to report under the target of 45 mph or faster 90% of peak periods – its also the only section of the corridor to not have added capacity. This is pulling down the overall average.

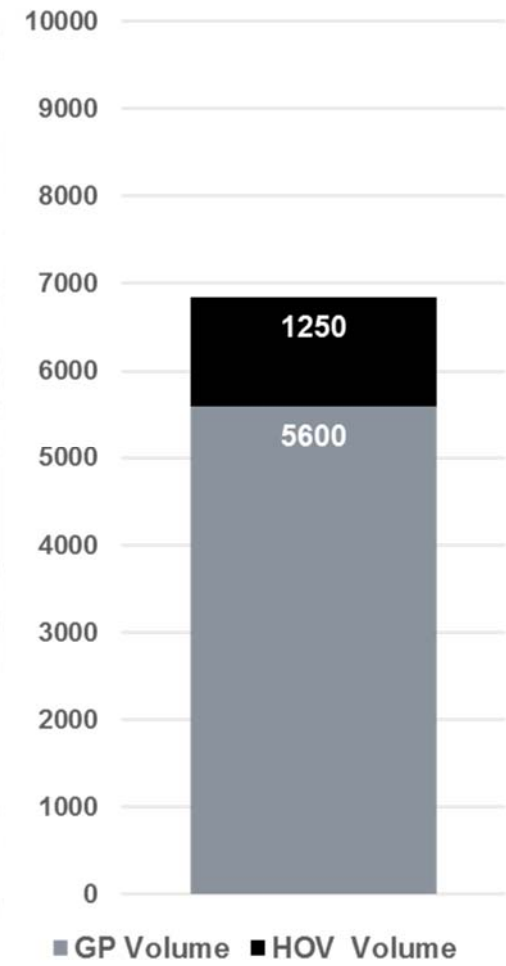
I-5 HOV and regular lanes experience extremely heavy traffic during rush hour

Northbound I-5 (Northeast 130th Street)

Daily Volume: 105,000



Peak-Hour Volume

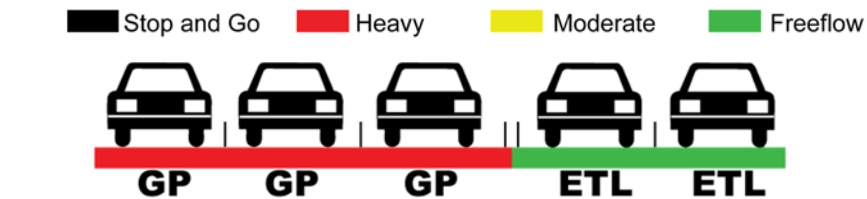


Tuesday, July 12, 2017 4:50 p.m.

I-405 express toll lanes offer a more reliable choice during afternoon rush hour

Northbound I-405 (north of Northeast 85th Street)

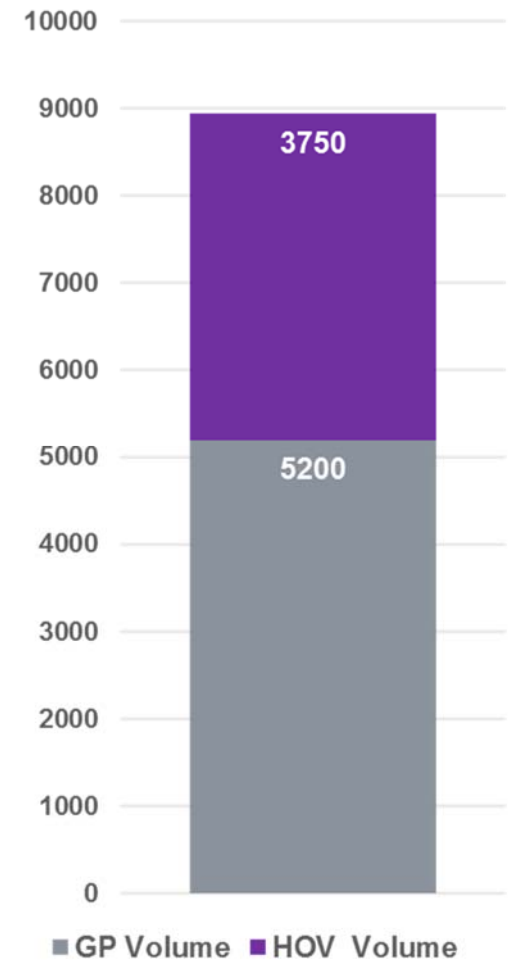
Daily Volume: 107,000



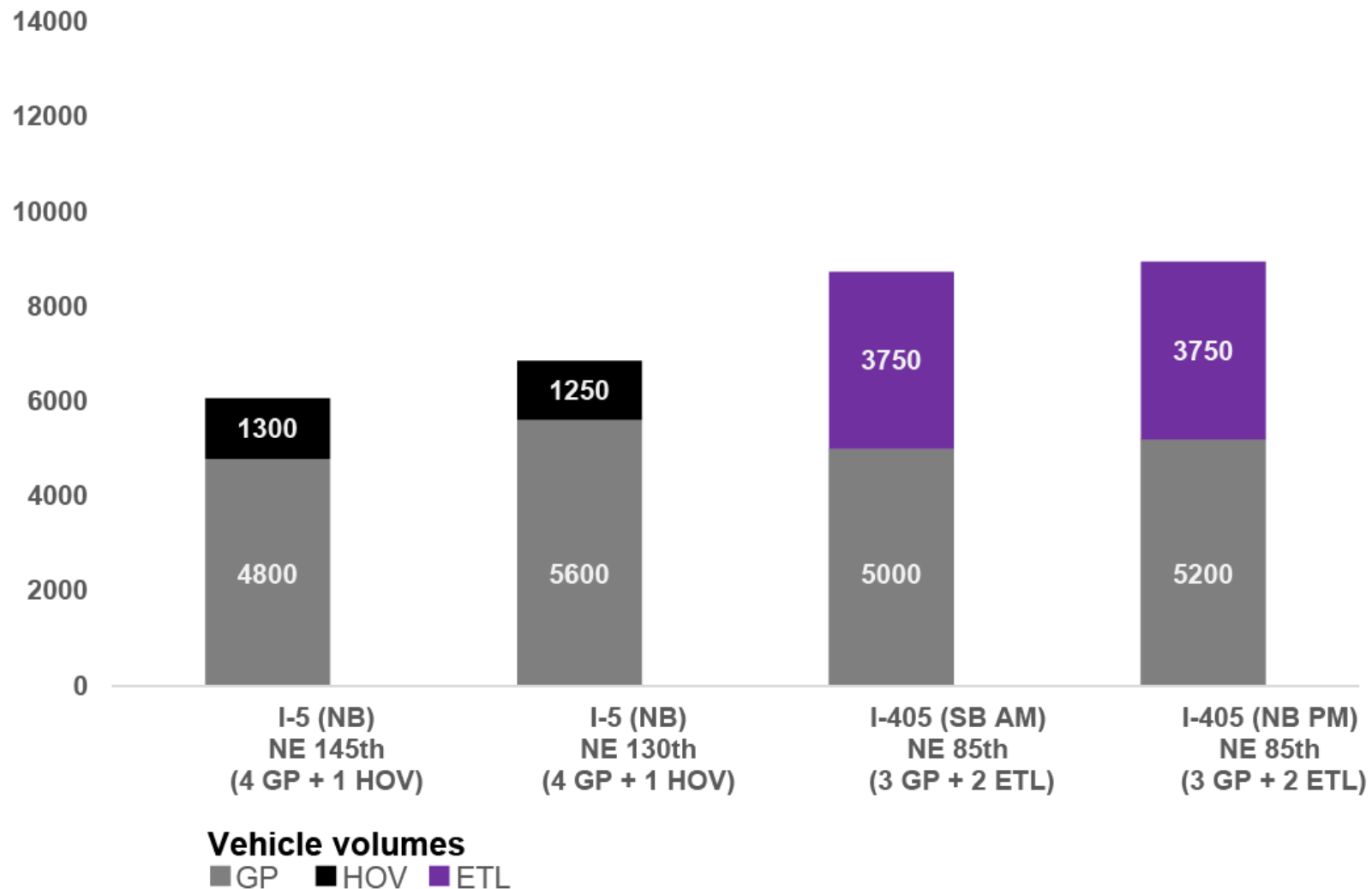
Tuesday, July 25, 2017 4:30 p.m.



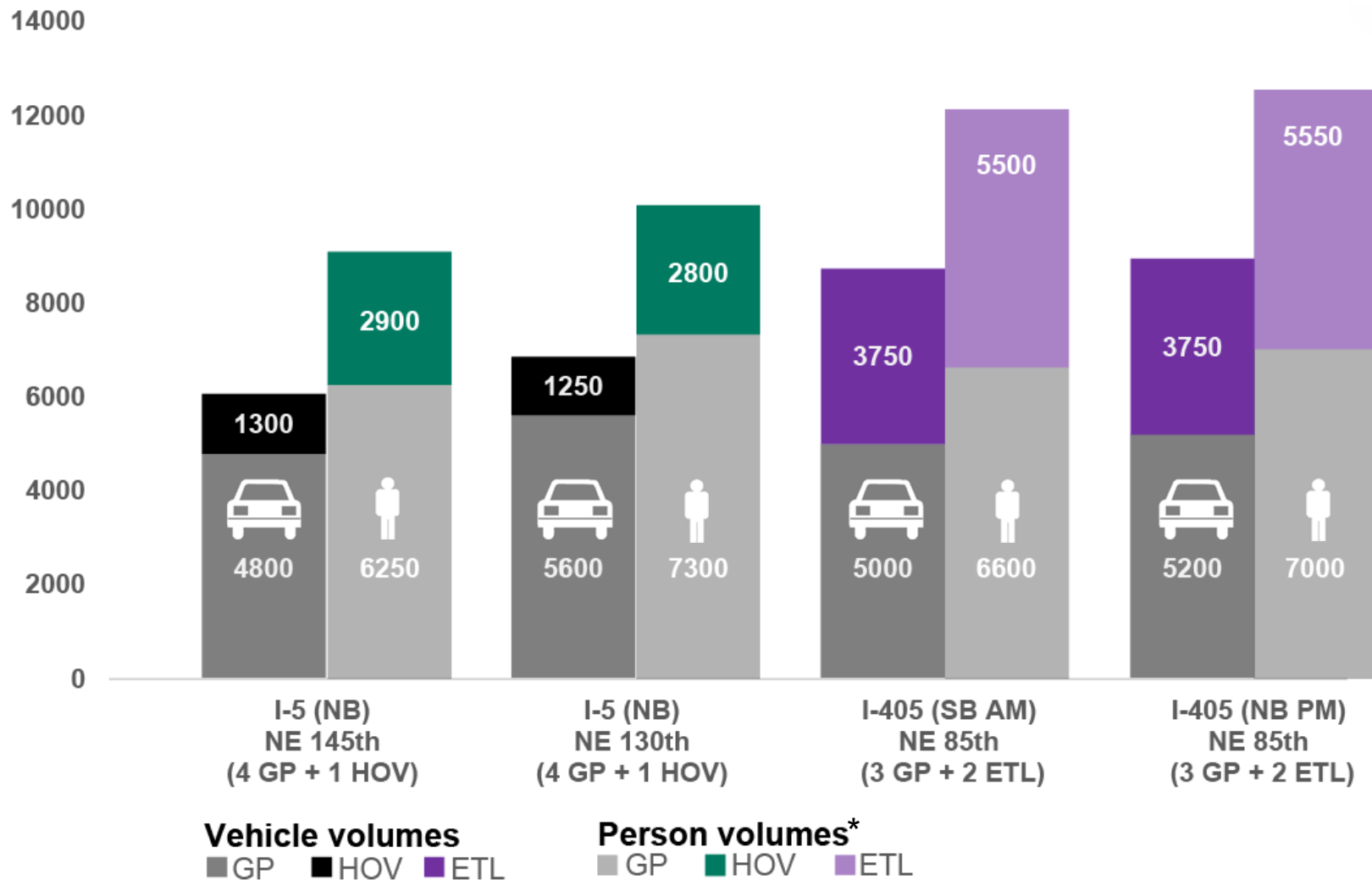
Peak-Hour Volume



Comparison of vehicles moved in five-lane sections of I-405 and I-5 with similar traffic



Comparison of people moved in five-lane sections of I-405 and I-5 with similar traffic



*I-5 person estimates based on TRAC occupancy data (2012). I-405 person estimates based on occupancy sampling (2017). Transit ridership not included in person estimates.

Transit agencies report benefits from I-405 express toll lanes

Community Transit

- Northbound bus travel times have improved 7.5% and reliability has improved
- Southbound bus travel times are consistent and arrive early more often
- Buses experienced twice as much variability on I-5 as on I-405, resulting in \$2.6 million in added schedule maintenance costs for 2015



King County Metro

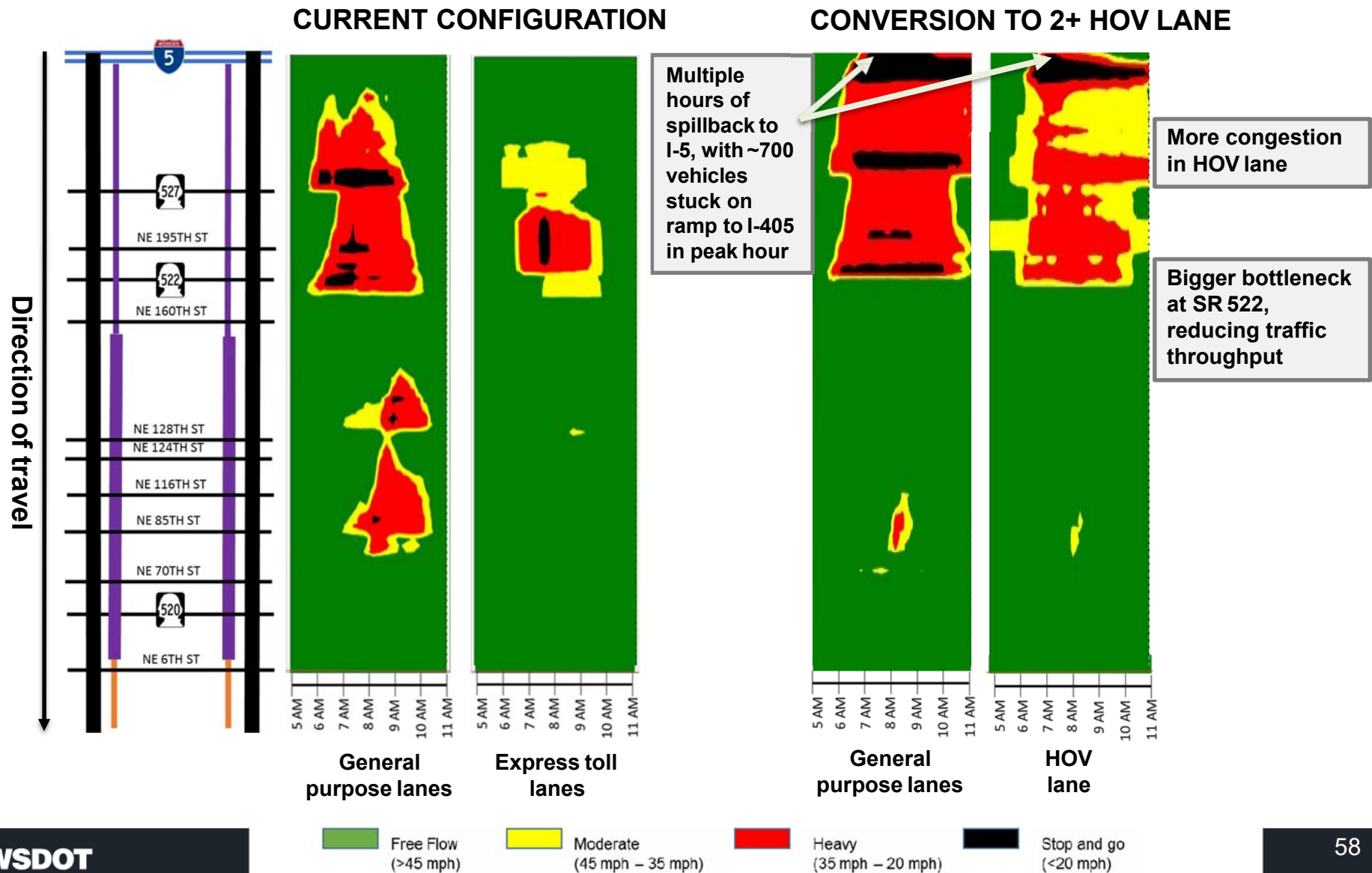
- Routes that travel on I-405 are moving faster since the express toll lanes opened between Bellevue and Lynnwood
- Afternoon trips are experiencing the greatest travel time savings (6 to 10 minutes)

Sound Transit

- Relying on express toll lanes to operate new I-405 Bus Rapid Transit system reliably

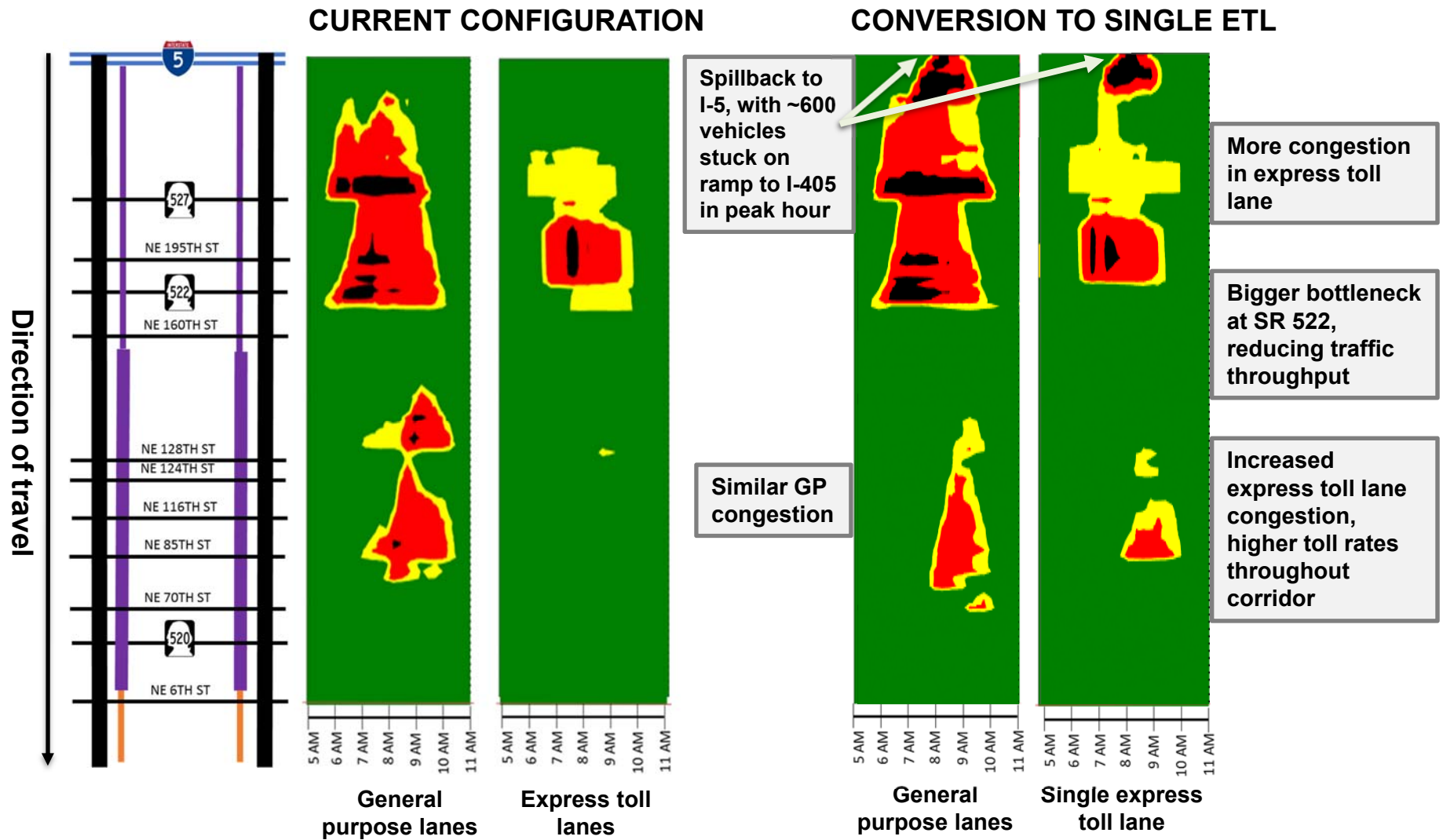
Comparison of traffic congestion with changes to express toll lane system

2017 Morning Commute, Lynnwood to Bellevue (5 to 11 a.m.)



Comparison of traffic congestion with changes to express toll lane system

2017 Morning Commute, Lynnwood to Bellevue (5 to 11 a.m.)



Potential next steps to accelerate north end improvements



- With optimal delivery, and assuming all funding can be identified, all planned improvements between SR 522 and SR 527 could be delivered by 2024.
- With toll revenue only (pay as you go), southbound capacity improvements could be accelerated by staging the project in two construction contracts:

Phase 1A – Southbound Capacity (\$225M)

- Partially rebuilds SR 522 interchange
- Second southbound express toll lane between SR 522 and SR 527

Phase 1B – Northbound Capacity and Transit (\$225-\$275M)*

- Second northbound express toll lane between SR 522 and SR 527
- Direct access ramp/Bus Rapid Transit station at SR 527
- Environmental and transit elements

**Not inflated*

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 |
|------------------|---|------|------|------|-----------------|------|------|------|-----------------------------------|------|------|------|-----------------------------------|-------------|------|------|------|
| Earlier Delivery | PE/RW | | | | Phase 1(A/B) CN | | | | | | | | | | | | |
| | Toll Revenue + other sources to be identified | | | | | | | | | | | | | | | | |
| Phased Delivery | PE/RW | | | | | | | | Phase 1A CN | | | | | Phase 1B CN | | | |
| | | | | | | | | | Toll Revenue only (Pay as you go) | | | | Toll Revenue only (Pay as you go) | | | | |

I-405/SR 522 Interchange

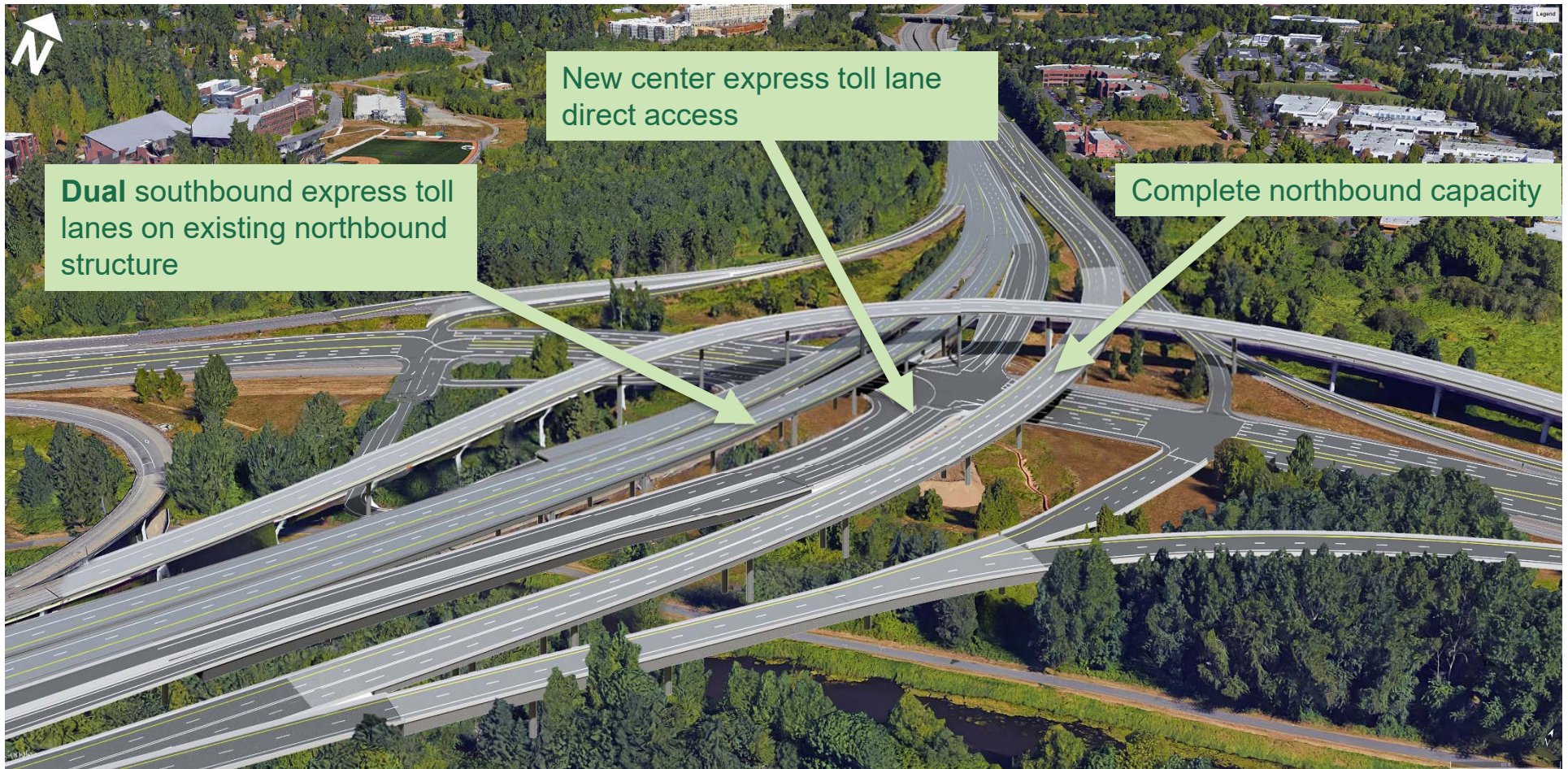
Existing conditions



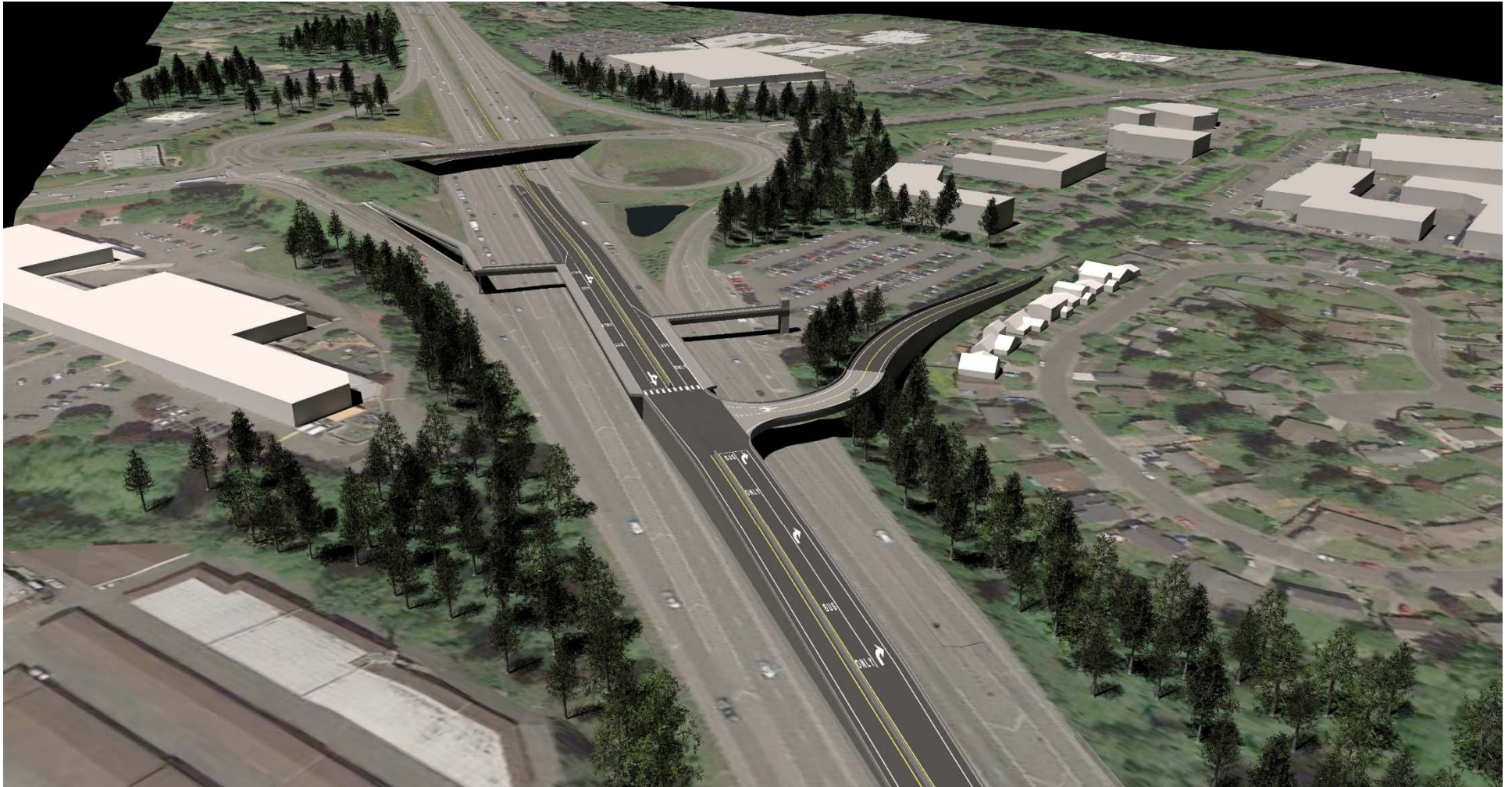
I-405/SR 522 Interchange Phase 1A



I-405/SR 522 Interchange Phase 1B



I-405/SR 527 Interchange



Preliminary OST Financial Analysis

- **Assumptions:**
 - Current law : Tolling I-405 Bellevue to Lynnwood with \$10 toll cap
 - Assumes sales beginning in FY 2021 with 25-year level debt service
 - Toll revenues pay for O&M and toll and facility R&R costs
- **Preliminary Results** (Scenarios require bond authorization):
 - If only toll revenue was pledged, approximately \$76.5 million in bond proceeds could be generated
 - If toll revenue, motor vehicle fuel tax, and the full faith and credit of the state were pledged, approximately \$200 million in bond proceeds could be generated

40 Mile Corridor

EAG endorsed 40-mile express toll lane plan in 2010

The existing I-405 express toll lanes between Bellevue and Lynnwood are part of a planned 40-mile corridor that will ultimately extend south to the Pierce County line. This system will provide drivers with an option for a faster, more reliable trip. Immediate next steps include:

I-405 Bellevue to Lynnwood Express Toll Lanes

- Opened September 2015

SR 167 HOT Lane Extension

- Opened December 2016

I-405/SR 167 Direct Connector

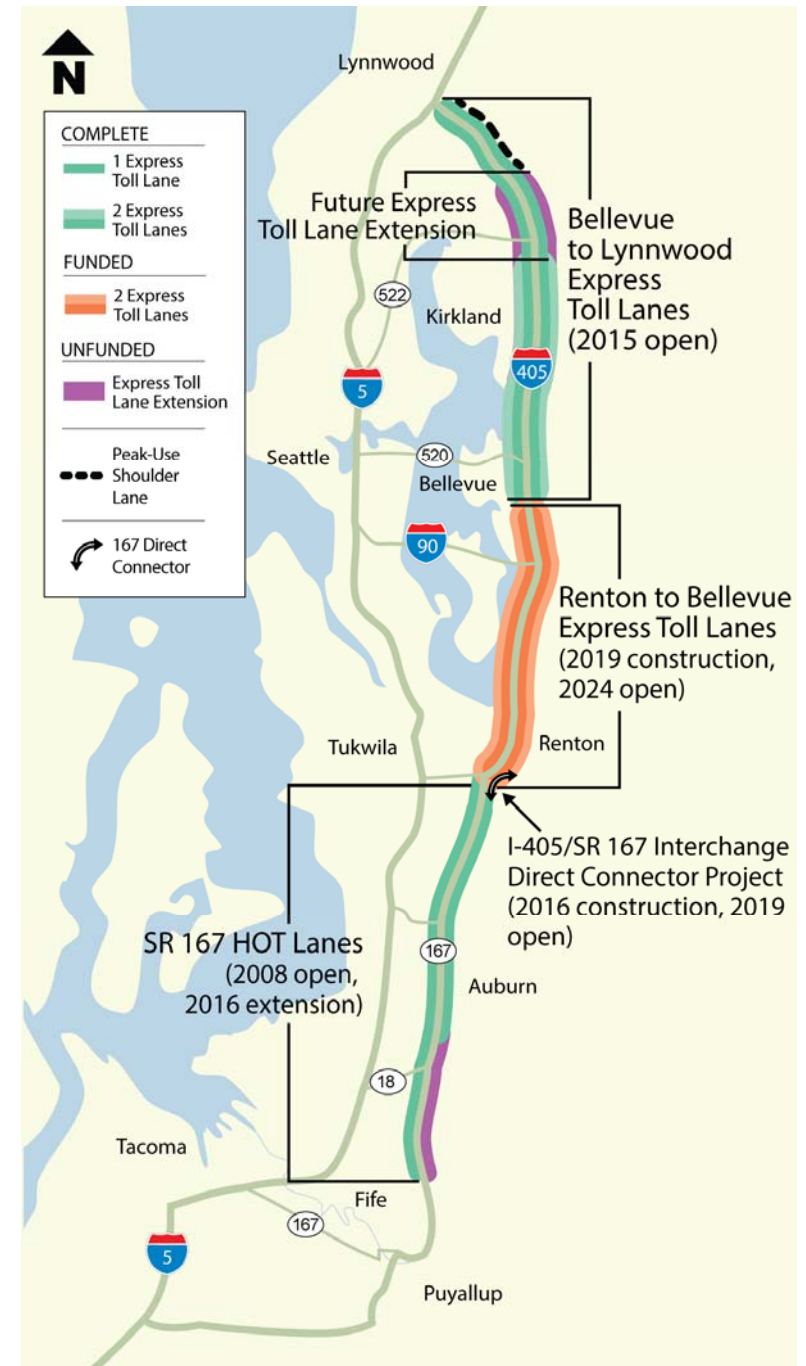
- Under construction
- Open to traffic in 2019

Renton to Bellevue Widening and Express Toll Lanes

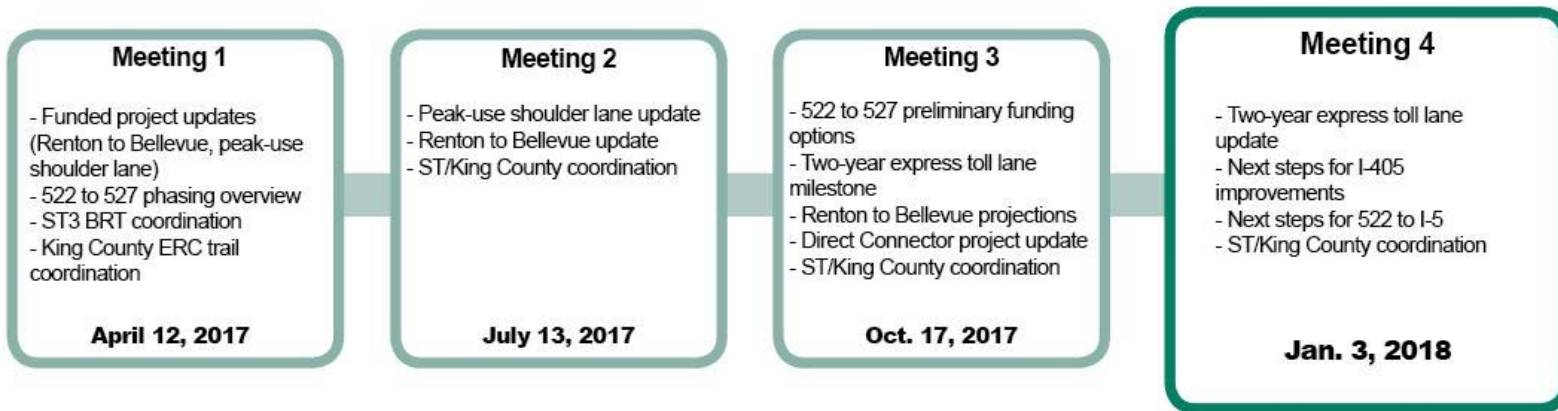
- Construction to begin in 2019
- Open to traffic in 2024

I-405 North End Improvements

- Legislature authorized \$5 million toward preliminary engineering



EAG Meeting Topics/Schedule



Key Discussion Questions for Meeting 4

- What are the EAG's recommendations on next steps for I-405 improvements?

Public Comment

Facilitated by:

Anne Broache

I-405/SR 167 Program Communications

Wrap Up

Roger Millar, P.E., AICP
Secretary of Transportation